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An Explanation of Base TETU Effects in Kwak'wala and Cupeño

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1. Introduction

Kwak'wala, formerly known as Kwakiutl, is a Northern Wakashan language of northern Vancouver Island, Canada. It presents what appear to be a number of disparate reduplication patterns that exhibit Base-TETU effects and therefore pose a problem for Base-Reduplicant Correspondence Theory (hereafter BRCT) (McCarthy and Prince 1999). These data were thought to be so unruly that Struijke (2002) proposed a whole new family of constraints to account for them called Existential Faithfulness constraints. However, I will show that new constraints are unnecessary because the data can be successfully analyzed using widely applicable faithfulness and markedness constraints.

This analysis of Kwak'wala has implications for other languages, too. Struijke (2002) reports that Base-TETU effects occur in Bella Coola, Tohono O'odham, and Klamath. The current analysis precludes the need for Existential Faithfulness constraints to solve the problems posed to BRCT by these types of languages. I will present data from the Uto-Aztecan language Cupeño exhibiting similar Base-TETU effects, and show that the current analysis can be extended to these forms as well. The Cupeño data have not been previously analyzed in this context.

2. Base-Reduplicant Correspondence Theory

Base-Reduplicant Correspondence is the name given to McCarthy and Prince's theory of reduplication which seeks to replace the copy-and-association model with a constraint-based correspondence model. In the Basic Model of BRCT, correspondence relationships are assumed between the Input and Output (termed IO-Faithfulness), and between the Base and Reduplicant (termed BR-Identity). (1) illustrates these relationships (McCarthy and Prince 1995, McCarthy and Prince 1999):

(1) *Input* /RED + STEM/

$\qquad$ *Output* RED ⟷ BASE

Constraints hold between the stem and the base, or between the base and the reduplicant, but not between reduplicant and stem. These relationships predict that TETU (The Emergence of the Unmarked) effects should arise in reduplicants rather than the base, and that emergent TETU effects in the base must also occur in the reduplicant. The universal ranking in (2), proposed by McCarthy and Prince (1999), yields the predicted results.

(2) I-O FAITHFULNESS >> MARKEDNESS CONSTRAINTS >> B-R IDENTITY

This ranking guarantees that markedness effects that appear in the reduplicant are not visible elsewhere in the language; in general they are outranked by faithfulness constraints between the input and the output.

3. Variable-TETU effects in Kwak'wala *-mut* Reduplication

In her analysis of Kwak'wala, Struijke (2002) argued that the language exhibits Reduplicant-TETU effects, Base-TETU effects, and both Reduplicant- and Base-TETU effects in reduplication associated with the suffix *-mút* 'useless, refuse'. Examples (3)-(5) show examples from the language exhibiting each effect (all data in these examples are from Boas (1947:339-340)).[1] In each example, the reduplicant identified by previous researchers is double underlined. In example (3), the reduplicant is a reduced copy of the base, as is predicted by BRCT. In example (4), however, it is the base that is reduced. Finally, in example (5), both the base and the reduplicant are reduced. Examples (4) and (5) are unpredicted by BRCT.

(3) Reduplicant-TETU effects

Root	*RED+Root+mút*	
ts'əm'	ts'əts'ə́m'əmút	'left after melting'
mendz	məméndzəmút	'leavings after cutting kindling'
c'^{w}əml'	c'^{w}əc'^{w}ə́ml'əmút	'remains of burning'
k'^{w}a:l'	k'^{w}ək'^{w}á:l'əmút	'embers'

(4) Base-TETU effects

Root	*RED+Root+mút*	
wən	wə́nwəmút	'refuse of drilling'
səl	sə́lsəmút	'what is left after drilling'
dəj	dé:dəmút[2]	'refuse of wiping'
xəw	xó:xəmút	'refuse of splitting wood'

[1] Boas (1947) also presents examples of what he calls "expansion", which are cases where *-mút* causes a change to the base vowel rather than reduplication. This process occurs in monomoraic bases, and while space does not allow a treatment of these examples here, they can be subsumed under the analysis presented in Section 4, but with the addition of a mora rather than a consonant.

[2] əj → e: and əw → o: syllable-finally by regular phonological rules (Boas 1947:212).

(5) Base-TETU and Reduplicant-TETU effects

Root	*RED+Root+mút*	
c’a:x^{w}	c’á:c’ax^{w}m’út	‘shavings’
ts’a:s	ts’á:ts’əsm’út	‘old eel-grass’
jənt	jə́njatm’út	‘knawings (not of mouse)’ *sic.*
cəmt	cə́mcatm’út	‘leavings after cleaning berries’

Struijke (2002) argues that reduplication is mediated by stress assignment in the language. Zec (1995) has previously demonstrated that sonorant codas are moraic in Kwak’wala, while obstruent codas are not (with the exception of glottalized sonorant codas, which are also not moraic). She bases her argument on stress rules in the language, in which all heavy syllables are stressed, including those with long vowels and those ending in sonorant consonants. Stress feet are iambic (Zec 1988). Based on these generalizations, Struijke (2002) demonstrates that the constraint *CLASH (example (6)) is active in reduplicated forms, but not in unreduplicated forms.

(6) *CLASH: Adjacent heads of feet are prohibited.
(Struijke 2002:56, citing Prince 1983)

This constraint explains the varying shape of the reduplicant (and the base); their shapes are determined by whether or not they will incur a *CLASH violation. Note that there are no adjacent stressed syllables in the reduplicated forms in examples (3) through (5). However, Struijke (2002:57) gives the examples in (7) and (8) of non-reduplicated Kwak’wala words from Boas (1947). In these words, stress may occur on adjacent syllables.

(7) ts’ó:l’ə́my’á: ‘longer on one side’

(8) té:nó:stá:lá: ‘to pole up river’

When we attempt to use the universal constraint ranking in (2) (here, I-O FAITHFULNESS >> *CLASH >> B-R IDENTITY), we find that it cannot account for all of the data. In the tableau in (9), the constraint ranking works for a word with Reduplicant-TETU effects.

(9)

	RED + k’^{w}a:l’-mút	FAITH-IO	*CLASH	FAITH-BR
Unfaithful base	i. k’^{w}á:k’^{w}əl’əmút	*!		
	☞ii. k’^{w}ək’^{w}á:l’əmút			*
Adjacent stress	iii. k’^{w}á:l’k’^{w}á:l’əmút		*!	

The attested candidate (ii) emerges because its base is faithful to the input and it doesn't violate *CLASH as (iii) does. However, in tableau (10), the constraint ranking fails for words with Base-TETU effects. Here, candidate (ii) wins, and the attested candidate (iii) fails because the stem is unfaithful to the base.

(10)

	RED + wən-mút	FAITH-IO	*CLASH	FAITH-BR
Adjacent stress	i. wəwə́nmú:t		*	*!
	💣 ii. wə́nwə́nmú:t		*	
Unfaithful base	☜iii. wə́nwəmú:t	*!		

Only by ranking *CLASH higher than I-O FAITHFULNESS can the unattested result in (10) be avoided. However, this ranking is undesirable because *CLASH is not active in unreduplicated words (e.g. examples (7) and (8)). To circumvent this ranking paradox, Struijke (2002) introduces a new family of constraints called Existential Faithfulness. However, in the next section I will show that the Kwak'wala data can in fact be accounted for without new constraints.

4. Rethinking the Reduplicant

The apparent variability seen in Kwak'wala reduplication can be successfully analyzed within the parameters of the BRCT predictions if we discard the assumption that the reduplicant is always a prefix. In fact, a reanalysis of the data suggests that what is happening in Kwak'wala is actually single-segment copying. In this section, I will demonstrate that a segment is copied from the left edge of the word and then either prefixed or infixed according to interactions between active faithfulness and markedness constraints. This analysis is consistent with an emerging body of work demonstrating similar approaches to partial reduplication (e.g. Hendricks 2001, Inkelas and Zoll 2005, Kawu 2000, Riggle 2004, Yu 2005).

(11)

Root	**Copied Segment**	**Previously Assumed Reduplicants**
ts'əm'	ts'-əts'ə́m'əmút	ts'ə-ts'ə́m'əmút
mendz	m-əméndzəmút	mə-méndzəmút
c'ʷəml'	c'ʷ-əc'ʷə́ml'əmút	c'ʷə-c'ʷə́ml'əmút
k'ʷa:l'	k'ʷ-ək'ʷá:l'əmút	k'ʷə-k'ʷá:l'əmút
wən	wə́n-w-əmút	wə́n-wəmút
səl	sə́l-s-əmút	sə́l-səmút
dəj	dé:-d-əmút	dé:-dəmút
xəw	xó:-x-əmút	xó:-xəmút
c'a:xʷ	c'á:-c'-axʷm'út	c'á:-c'axʷm'út
ts'a:s	ts'á:-ts'-əsm'út	ts'á:-ts'əsm'út
jənt	jə́n-j-atm'út	jə́n-jatm'út
cəmt	cə́m-c-atm'út	cə́m-catm'út

Table (11) presents the proposed copies in the middle column, with the previously assumed reduplicants in the right-hand column (from examples (3)-(5)). Under the current analysis, an empty C-slot is triggered by the suffix *-mút.* The C-slot is aligned and filled according to the interaction of ranked, violable constraints. With this simple assumption, all of the paradoxical Base-TETU effects disappear because the base actually remains unchanged.

The only challenge faced by this assumption is in positioning the C-slot correctly. The empty segment is left aligned to the base due to the constraint in (12).

(12) ALIGN-L$_{BASE}$ (C, R, BASE, L): Align the right edge of the segment to the left edge of the base. *'Be a prefix'*

However, alignment to the base is violable for the higher ranking *CLASH. Other constraints may also interfere with its alignment, such as (13) and (14).

(13) *COMPLEX ONSET (*$_{\sigma}$[CC): No complex syllable onset.

(14) *STRUCTURE-SYLLABLE (*STRUC): Each syllable in the output incurs a penalty. '*Minimize syllables.'*

In addition, the segment must be aligned with the left edge of the syllable to avoid unattested forms like **wəẃnəmút*. Left alignment is guaranteed by the highly ranked constraint in (15).

(15) ALIGN-Lσ (C, R, σ, L): Align the right edge of the segment to the left edge of a syllable. '*Be an onset.'*

Tableau (16) demonstrates the interaction of these constraints in a word with apparent Base-TETU effects.

(16)

	C+ wən-mút	ALIGN-Lσ	*CLASH	*$_{\sigma}$[CC	*STRUC	ALIGN-L$_{BASE}$
Adjacent stress	i. wə́nwə́nmút		*!		***	
Adjacent stress	ii. wəwə́nmút		*!		***	
Adjacent consonants	iii. wwə́nmút			*!	**	
	☞iv.wə́nwəmút				***	***
Too many syllables	v. wəwə́nəmút				****!	
Not an onset	vi. wə́wnəmút	*!			***	**

Candidates (i) and (ii) fail because they violate *CLASH. Candidate (iii) has a complex onset and loses. Candidate (v) loses because it has one more syllable than the winning candidate (iv), violating *STRUC. The reduplicant in candidate (vi) doesn't form the onset of a syllable. Despite numerous violations of ALIGN-L_{BASE}, candidate (iv) emerges victorious.

Further constraints are required to ensure that the added consonant is a copy of the first consonant. Copying constraints are given in (17)-(19):

(17) ANCHOR-L (C, WORD): The added C has a correspondent at the left periphery of the input word. *'Copy the left-most consonant.'*

(18) DEP-C: Don't epenthesize a consonant.

(19) INTEGRITY: No element of S_1 has multiple correspondents in S_2. *'Don't copy.'*[3] (McCarthy and Prince 1995:372)

Finally, all reduplicants have an epenthesized vowel to avoid violations of *CLASH and *COMPLEX ONSET. By ranking DEP-V, (20), below INTEGRITY, the reduplicant vowel is epenthesized rather than copied.[4] The ranking in (21) makes it better to copy a consonant than to epenthesize one. ANCHOR-L further ensures that the copied consonant is the left-most consonant in the base.

(20) DEP-V: Don't epenthesize a vowel.

(21) ANCHOR-L, DEP-C >> INTEGRITY >> DEP-V

Tableau (22) demonstrates the constraint ranking in a word with apparent Base-TETU effects:

(22)

	C+ wən-mút	ANCHOR-L	DEP-C	INTEGRITY	DEP-V
Copy of wrong segment.	i. wə́nməmút	*!		*	*
Epenthesized segment.	ii. wə́nʔəmút		*!		*
	☞iii. wə́nwəmút			*	*

[3] This constraint was used by Yu (2005) in his analysis of Washo reduplication. It has also been used by Kawu (2000) in his analysis of Yoruba gerundial affixation, Temiar simulfactive affixation, and Makassarese coda condition effects.

[4] The epenthesized vowel is always realized as /a/ or /ə/. Boas (1947:207) notes that all surface realizations of /ə/ are underlyingly /a/, but does not give the conditioning environments. Bach (1975:footnote 9) states that he has encountered difficulties discovering the environmental contrasts based on Boas' transcriptions.

Candidate (iii) in (22), which doesn’t epenthesize a consonant or copy from the wrong portion of the word, emerges as the winner. All three candidates violate DEP-V, but this constraint is low-ranked and has no effect on the final outcome.

Tableaux (24) and (25) demonstrate the current analysis for apparent Reduplicant-TETU and Base- and Reduplicant-TETU examples. For (24), another constraint must be included dictating against unreleased glottalized consonants (see the constraint in (23)).

(23) *C’C: A glottalized consonant cannot be followed by a consonant.

(24)

	C + k’^{w}a:l’-mút	*CLASH	*C’C	*STRUC	ALIGN-L
Adjacent stress	i. k’^{w}á:l’k’^{w}á:l’mút	*!		***	
	☞ii. k’^{w}ək’^{w}á:l’əmút			****	
Glottalized C followed by C	iii. k’^{w}á:l’k’^{w}əmút		*!	***	***
Too many syllables	iv. k’^{w}á:l’ək’^{w}á:l’əmút			*****!	

In (24), the winning candidate (ii) doesn’t have an infixed reduplicant as in tableau (16) because it’s not needed to prevent violations of *CLASH. However, the reduplicant must be reduced. Candidate (iv) demonstrates that epenthesizing multiple vowels to avoid *CLASH creates too many violations of *STRUC and the output fails.

(25)

	C + jənt-mút	*CLASH	*$_{\sigma}$[CC	*STRUC	ALIGN-L
	☞i. jə́njatm’út			***	***
Adjacent stress	ii. jajə́ntm’út	*!		***	
Too many syllables	iii. jajə́ntəm’út			****!	
Too far away from left edge of word	iv. jə́ntjam’út			**	****!

In (25), the winning candidate’s reduplicant appears between the two coda consonants of the first syllable of the base, avoiding a *CLASH violation. Candidate (iv) also avoids *CLASH, but fails because it has too many violations of ALIGN-L.

Under the current analysis, the base is always more faithful to the input than the reduplicant is, as predicted by BRCT. Crucially, the reduplicant is not always a prefix, but rather a copied consonant whose alignment varies according to markedness constraints.

5. Variable-TETU effects in Cupeño Reduplication

The solution presented for Kwak'wala is also successful in the Uto-Aztecan language Cupeño. Cupeño is a language of southern California belonging to the Takic branch of Uto-Aztecan. Like Kwak'wala, Cupeño exhibits apparent variable-TETU effects in one type of reduplication. This type of reduplication most often occurs as prefixing, as described by Hill (2005). I will refer to it here as CV-prefixing reduplication, as this appears to be what is occurring at first glance. Examples are in (26)-(28):

(26) CVC-base: kúkup 'lie around in bed' (< kúp-Ø 'sleep') (Hill 2005:142)

(27) CVV-base: púßulim 'doctors' (< púu-l-m 'doctor') (Hill 2005:31)

(28) CV-base: nə́ntam 'chiefs, lineage heads' (< nə́-t-m 'chief') (Hill 2005:30)

Only (26) is not a counterexample to the predictions made by BRCT. If we are to analyze CV-prefixing reduplication as a prefixing phenomenon, we will have to say that in (27), the base's vowel is shortened. In (28), the base's vowel is lost, while the reduplicant's vowel remains intact. However, it is unusual in Cupeño for prefixation to cause the deletion of a root vowel, stressed or unstressed. Hill (2005:31) states, "Cupeño prefixes … have no effect on the shape of the root, even when, in the case of a prefix with a stressless root, the stress is on the prefix and the root vowel is unstressed."

I propose an analysis similar to the one proposed for Kwak'wala. The reduplicant is actually an empty C-slot that is aligned and filled according to the interactions of ranked, violable constraints. The proposed reduplicant positions for (27) and (28) are double-underlined in (29) and (30):

(29) púßulim

(30) nə́ntam

The relevant constraints are the same as in Kwak'wala. The proposed constraint ranking is in (31):

(31) ANCHOR-L, * $_{\sigma}$[CC >> DEP >> INTEGRITY >> ALIGN-L$_{\text{BASE}}$

The ranking is exemplified for (29) and (30) in the tableaux in (32) and (33). In (32), candidate (ii) has the fewest violations of more highly ranked constraints. Candidate (i) exhibits a complex onset and candidate (vi) fails to anchor the copied material to the left edge of the word. Candidate (iv) crucially violates DEP by epenthesizing a segment rather than copying material, making it a worse candidate than both (ii) and (iii). Candidate (ii) emerges victorious over candidate (iii) because it has one less ALIGN-L$_{\text{BASE}}$ violation.

(32)

	puu-l + C (+m)	ANCH-L	*$_{\sigma}$[CC	DEP	INTEG	ALIGN-L$_{BASE}$
Adjacent consonants	i) **p**puul-im		*!	*	*	
	☞ ii) pu**p**ul-im			*	*	**
Too far away from left edge of word	iii) puu**p**l-im			*	*	***!
Epenthesized segment.	iv) pu**ʔ**ul-im			**!		**
Copy of wrong segment.	vi) pu**l**ul-im	*!		*	*	**

In (33), candidate (i) meets the Align-L constraint perfectly, but ultimately fails because it creates a complex onset. Candidate (ii) fails because the morpheme is too far away from the left edge of the word. Candidate (iv) copies material from the right edge of the word, crucially violating ANCHOR-L. Candidates (iii) and (v) are equal in every respect except that candidate (v) epenthesizes a segment rather than copying it, violating DEP. Because DEP is ranked before INTEGRITY, (iii) wins. (Note that DEP is violated at least one time by every candidate to prevent the suffix from forming a heavy syllable. Hill (2005) notes that Cupeño avoids ending words with CC sequences and syllables with CCC sequences.)

(33)

	nət + C (+m)	ANCH-L	*$_{\sigma}$[CC	DEP	INTEG	ALIGN-L$_{BASE}$
Adjacent consonants	i) nnət-am		*!	*	*	
Too far away from left edge of word	ii) nətn-am			*	*	***!
	☞iii)nənt-am			*	*	**
Copy of wrong segment.	iv) nəmt-am	*!		*	*	**
Epenthesized segment.	v) nəʔt-am			**!		**

This analysis also works for the example in (26), though there is further involvement with regular stress rules in the language. Though initially it would seem that the reduplicant in (26) is a prefix without violation of the predictions of BRCT, Hill (2005) indicates that a shift in lexical stress is avoided. We must therefore assume that the proper reduplicant alignment is the one given in (34).

(34) kú<u>ku</u>p

Hill's statement about stress prompts the constraint in (35).

(35) *STRESSSHIFT (*STRSH): Lexical stress corresponding to a syllable A in S_1 corresponds to syllable A in S_2. '*Don't shift stress.*'

This constraint is highly ranked compared to the other constraints. The constraint against heavy syllables also comes into play (example (36)).

(36) *HEAVY-σ (*H-σ): No heavy syllables.

Both constraints are highly ranked, yielding the tableau in (37).

(37)

	kup + C	*STRSH	*H-σ	$*_{\sigma}$[CC	ALIGN-L
Adjacent consonants	i) **k**kúp			*!	
Heavy syllable	ii) kú**k**p		*!		**
Stress shifted	iii) **kú**kup	*!			
	☞v) kú**ku**p				**

Candidates (i), (ii), and (iii) in (37) are eliminated for violating the highly ranked constraints against complex onsets, heavy syllables, and shifting stress, respectively.

At first glance, Cupeño CV-"prefixing" reduplication exhibits both Reduplicant-TETU and Base-TETU effects, a situation not predicted by BRCT. However, a reanalysis of what constitutes the reduplicant has allowed for an explanation of all three types of reduplication that is both within the bounds of BRCT and that employs commonly exploited constraints. Note that this analysis has relied on phonological copying constraints similar to those proposed in Riggle (2004) and Yu (2005). However, the data do not preclude an analysis using RED=C, FAITH-BR, and other familiar reduplication constraints. What is important here is that the reduplicant is actually an infixed copied consonant, but the method of copying may fall under either a reduplication or a phonological copying analysis.

6. Conclusion

This paper has presented an analysis of apparent variable-TETU effects in both Kwak'wala and Cupeño without the addition of special constraints to the theory. In each case, the interaction of ranked, violable and widely applicable constraints determines the alignment of material copied from the edge of the base. However, in order to preserve the predictions made by BRCT it is necessary to abandon the presupposition that partial reduplication is an edge-in phenomenon (i.e. prefixing or suffixing). By allowing the reduplicant to be an infix, the prediction that the base is always more faithful to the input than the reduplicant is preserved in languages that otherwise appear to have Base-TETU effects.

This analysis precludes the need for special constraints like those of Existential Faithfulness (Struijke 2002) to explain Base-TETU effects in Kwak'wala. Furthermore, I have shown that this analysis is applicable in a non-related language, Cupeño, which exhibits similar apparent Base-TETU effects. Other languages exhibiting Base-TETU effects include Bella Coola, Tohono O'odham, and Klamath. Thus, the current analysis has potentially broad applicability in the examination of reduplication processes.

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